

20. A method of preparing a nonwoven web having substantially continuous synthetic fine fiber, comprising the steps of:

5 a. preparing an aqueous amide crosslinked polymer solution of about 10 to about 75 percent by weight of a linear super-absorbent precursor polymer having a molecular weight of from about 300,000 to about 10,000,000;

10 b. extruding said polymer solution at a temperature of from about 20°C to about 180°C and a viscosity of from about 3 to about 1000 Pa sec through a die having a plurality of orifices to form a plurality of threadlines, said orifices having diameters in the range of from about 0.20 to about 1.2 mm; and

15 c. attenuating said threadlines with a primary gaseous source under conditions sufficient to permit the viscosity of each threadline, as it leaves a die orifice and for a distance of no more than about 8 cm, to increase incrementally with increasing distance from the die, while substantially maintaining uniformity of viscosity in the radial direction, at a rate sufficient to provide fibers having the desired attenuation and mean fiber diameter without significant fiber breakage.

20 21. A method of preparing a nonwoven web having substantially continuous synthetic fine fiber as set forth in Claim 20, wherein said primary gaseous source has a relative humidity of from about 30 to 100 percent.

25 22. A method of preparing a nonwoven web having substantially continuous synthetic fine fiber as set forth in Claim 21, wherein said primary gaseous source has a temperature of from about 20°C to about 100°C, a velocity of from about 150 to about 400 m/s, a horizontal angle of incidence of from about 70° to about 110°, and a vertical angle of incidence of no more than about 90°.

23. A method of preparing a nonwoven web having substantially continuous synthetic fine fiber as set forth in Claim 20, wherein said primary gaseous source has a relative humidity of from about 60 to 95 percent.

5 24. A method of preparing a nonwoven web having substantially continuous synthetic fine fiber as set forth in Claim 23, wherein said primary gaseous source has a temperature of from about 20°C to about 100°C, a velocity of from about 30 to about 150 m/s, a horizontal angle of incidence of from about 70° to about 110°, and a vertical angle of incidence of no more than about 90°.

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25. A method of preparing a nonwoven web having substantially continuous synthetic fine fiber as set forth in Claim 20, wherein said primary gaseous source has a relative humidity of from about 65 to 90 percent.

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26. A method of preparing a nonwoven web having substantially continuous synthetic fine fiber as set forth in Claim 25, wherein said primary gaseous source has a temperature of from about 20°C to about 100°C, a velocity of less than about 30 m/s, a horizontal angle of incidence of from about 70° to about 110°, and a vertical angle of incidence of about 90°.

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27. A method of preparing a nonwoven web having substantially continuous synthetic fine fiber as set forth in Claim 22, further comprising:

25 d. drying said threadlines to form fibers with a secondary gaseous source at a temperature of from about 140°C to about 320°C and having a velocity of from about 60 to about 125 m/s, which secondary gaseous source has a horizontal angle of inci-

dence of from about 70° to about 110°, and a vertical angle of incidence of no more than about 90°.

28. A method of preparing a nonwoven web having substantially continuous synthetic fine fiber as set forth in Claim 27, further comprising:

5 e. depositing the fibers randomly on a moving foraminous surface to form a substantially uniform web on a scale of from about 0.4 to about 1.9 cm², said moving foraminous surface being
10 from about 10 to about 60 cm from the opening from which the last gaseous source to contact the threadlines emerges, which fibers
15 have a mean fiber diameter in the range of from about 0.1 to about 10 µm and are substantially free of shot; wherein said
20 attenuating and drying steps are carried out under conditions of controlled macro scale turbulence and said fibers are of a length such that they can be regarded as continuous in comparison with their diameters.

25 29. A method of preparing a nonwoven web having substantially continuous synthetic fine fiber as set forth in Claim 28 further comprising:

30 f. exposing said uniform web to a high energy source selected from the group consisting of heat, electron beam, microwave, and radio frequency irradiation to render a stable crosslink in the synthetic precursor polymer.

25 30. A method of preparing a nonwoven web having substantially continuous synthetic fine fiber as set forth in Claim 28, further comprising:

30 g. post treating the stabilized web by humidifying, compacting, embossing, bonding, or laminating, or a combination thereof.

31. A method of preparing a nonwoven web having substantially continuous synthetic fine fiber as set forth in Claim 24, further comprising:

5 d. drying said threadlines to form fibers with a secondary gaseous source at a temperature of from about 140°C to about 320°C and having a velocity of from about 30 to about 150 m/s, which secondary gaseous source has a horizontal angle of incidence of from about 70° to about 110°, and a vertical angle of incidence of no more than about 90°.

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32. A method of preparing a nonwoven web having substantially continuous synthetic fine fiber as set forth in Claim 31, further comprising:

15 e. depositing the fibers randomly on a moving foraminous surface to form a substantially uniform web on a scale of from about 1.9 to about 6.5 cm², said moving foraminous surface being from about 10 to about 100 cm from the opening from which the last gaseous source to contact the threadlines emerges, which fibers have a mean fiber diameter in the range of from about 10 to about 30 µm and are substantially uniform in diameter; wherein said attenuating and drying steps are carried out under conditions of minimal macro scale turbulence.

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33. A method of preparing a nonwoven web having substantially continuous synthetic fine fiber as set forth in Claim 32, further comprising:

25 f. exposing said uniform web to a high energy source selected from the group consisting of heat, electron beam, microwave, and radio frequency irradiation to render a stable crosslink in the synthetic precursor polymer.

34. A method of preparing a nonwoven web having substantially continuous synthetic fine fiber as set forth in Claim 33, further comprising:

5 g. post treating the stabilized web by humidifying, compacting, embossing, bonding, or laminating, or a combination thereof.

35. A method of preparing a nonwoven web having substantially continuous synthetic fine fiber as set forth in Claim 26, further comprising:

10 d. drying said threadlines to form fibers with a secondary gaseous source at a temperature of from about 140°C to about 320°C and having a velocity of less than about 30 m/s, which secondary gaseous source has a horizontal angle of incidence of from about 70° to about 110°, and a vertical angle of incidence of no more than about 90°.

15 36. A method of preparing a nonwoven web having substantially continuous synthetic fine fiber as set forth in Claim 35, further comprising:

20 e. attenuating said fibers with a tertiary gaseous source having a temperature of from about 10°C to about 50°C, a velocity of from about 30 to about 240 m/s, a horizontal angle of incidence of from about 70° to about 110°, and a vertical angle of incidence of no more than about 90°.

25 37. A method of preparing a nonwoven web having substantially continuous synthetic fine fiber as set forth in Claim 36, further comprising:

30 f. depositing the fibers randomly on a moving foraminous surface to form a substantially uniform web on a scale of from about 1.9 to about 6.5 cm², said moving foraminous surface being

from about 10 to about 100 cm from the opening from which the last gaseous source to contact the threadlines emerges, which fibers have a mean fiber diameter in the range of from about 10 to about 30 μm and are substantially uniform in diameter; wherein
5 said attenuating and drying steps are carried out under conditions of minimal macro scale turbulence.

38. A method of preparing a nonwoven web having substantially continuous synthetic fine fiber as set forth in Claim 37, further comprising:

10 g. exposing said uniform web to a high energy source selected from the group consisting of heat, electron beam, microwave, and radio frequency irradiation to render a stable crosslink in the synthetic precursor polymer.

15 39. A method of preparing a nonwoven web having substantially continuous synthetic fine fiber as set forth in Claim 38, further comprising:

h. post treating the stabilized web by humidifying, compacting, embossing, bonding, or laminating, or a combination thereof.